The Effect of Combination Birth Control Pills on Heart Rate, Blood Pressure, Body Weight and Body Temperature

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Birth control pills are the most popular method of birth control for women. In the United States of America, roughly 10.2 million women use some type of birth control pills. The two main types of birth control pills available to women are combination pills, which contain both estrogen and progestin, and progestin-only birth control pills that do not contain any estrogen. Numerous biological research studies have been performed studying the effects of combination birth control pills on blood pressure and body weight. However, few studies have examined blood pressure combined with both heart rate, body temperature, and body weight to study the effects of combination birth control pills. We hypothesized that women taking combination birth control pills will have higher heart rates, blood pressures, body weights, and body temperatures when compared to the control group. This research study consisted of 40 women from Columbia College who were either on combination birth control pills or a member of the control group, which meant they were not on any form of hormonal birth control. Students came in twice a week for eight weeks to have their heart rate, blood pressure, and body temperature measured to determine the effect, if any, of birth control on these factors. Body weight was measured once during the beginning of the study and once at the end. The research study recently concluded and data was analyzed through statistical analysis (SPSS) using both ANOVA and t-tests.

Introduction

Combination birth control pills contain both estrogen and progestin, which are two hormones that function within human females differently. Estrogen is considered the main female sex hormone and functions to regulate the entire female reproductive system as well as the production of secondary sex characteristics.[1] The hormone, progestin, is the synthetic form of progesterone that naturally occurs and functions in females to regulate the menstrual cycle and maintain the early stages of pregnancy from the corpus luteum.[1] Combination birth control pills contain estrogen which suppresses ovulation (preventing the release of an egg) and progestin which thickens cervical mucus and also thins the endometrium.[1]

The endometrium is the innermost layer of the uterus and is comprised of simple columnar epithelial tissue with surrounding connective tissue that generally varies in thickness due to hormonal changes.[1] In females of reproductive age, the endometrium contains both a functional and basal layer. The functional layer of the endometrium is altered by the hormone progesterone from the corpus luteum during the luteal phase of the menstrual cycle.[2] All of these changes that occur during menstruation, within the functional layer of the endometrium, are to ensure an ideal environment for the implantation and development of a potential zygote.[2] If pregnancy does not occur, the functional layer of the endometrium is shed during menstruation.[2]

Numerous studies examining birth control pills have been performed and conclude that women taking combination birth control pills have higher blood pressures.[1,2,3,4] Additionally, combination birth control pills are not generally prescribed in women who are over thirty-five years-old, smokers, have a history of high blood pressure, migraines, or many other specific risk factors since birth control pills can cause many side effects because the medication is absorbed by the bloodstream and then in turn goes everywhere within the female body.[3] Although current research suggests a connection between birth control and high blood pressure, very few studies have been performed to determine the effect of birth control on other important factors in women's health. The overall goal of this research project was to determine if there was a significant difference in heart rate, blood pressure, body weight, and body temperature in women taking combination birth control pills compared to a control group not on any hormonal birth control.

Methods

IRB Approval

A letter of research intent was filed and sent to the Intuitional Review Board to ensure this human research project was conducted in an ethical and confidential manner.

Parameters

The parameters for this research study were set as follows: participants must have taken the combination pill for a minimum of six weeks prior to participating in the study, have had no history of high blood pressure or smoking, and been consistent with the timing of taking their pill. The control group participants must have not taken hormonal birth control for a minimum of six weeks and agreed not to consume any form of hormonal birth control for the duration of the study.

Intake of Research Participants

Columbia College women volunteered for this research project via a survey inquiry on Survey Monkey where basic medical questions were asked: "Are you currently taking birth control pills?", "Do you have a history of high blood pressure?", "Do you smoke?", "If you are not on hormonal birth control pills, would you like to participate in the control group?", and "If you are taking birth control pills please provide the name below." After receiving all of the surveys, the participants birth control pills were researched to ensure they were indeed a type of combination birth control pill. To incentivize participants, all students who remained compliant for the duration of the study were entered into a drawing for a gift card. In total, there were 40 compliant research subjects (16 in the control and 24 in the birth control group) throughout the eight-week research study.

Equipment

The equipment purchased for this research project included a WelchAllyn Spot vital signs monitor, which contained a 15-second blood pressure reading, heart rate, and oral body temperature function, and a Health-O-Meter scale for body weights and heights.

Procedure

The research study was conducted in a private laboratory on Columbia College's campus to ensure participant confidentiality. Each week, approximately 14-20 open hours were dedicated to when research participants could come in for their vital sign checks. Upon initial intake, each research participant was weighed and had their body height measured in addition to their first vital signs check. Each research subject received vital sign checks twice per week for eight weeks and all of the data was categorized in Microsoft Excel according to birth control or control group and stored in a safe location. Body weight was only measured twice throughout this study once during the initial intake and then at the end of the study.

Results

All data was analyzed via statistical analyses. First, SPSS was used to run an ANOVA or analysis of variance to determine if time was a significate factor within this research project. Upon completion of the

ANOVA, time was not considered a significant factor. Next, t-tests were conducted for heart rate, blood pressure, body temperature, and body weight for both the control group and birth control group to determine if there was a significant difference. After completion of all t-tests, no significant differences were found regarding heart rate, blood pressure, body temperature, or body weight, $p > 0.05$. Upon completion of the t-tests, overall means for blood pressure, heart rate, body temperature, and body weight between both groups were performed. Due to layout of the computer program SPSS, systolic blood pressure and diastolic blood pressure had to be separated. A systolic blood pressure is the maximum blood pressure within the blood vessels when the heart is contracting and diastolic blood pressure is the pressure when the heart is resting.[4] The table below (Table 1) displays the means for blood pressure, heart rate, body temperature, and body weight. As seen from the table, the birth control group contained overall higher means for blood pressure both systolic and diastolic, heart rate, and body weight.

Table 1. Mean data results for systolic blood pressure, diastolic blood pressure, heart rate, body temperature, and body weight compared to a combination birth control group and a control.

Birth Control Group	Control Group
Mean Systolic BP: 121.41 mmHg	Mean Systolic BP: 114.63 mmHg
Mean Diastolic BP: 79.86 mmHg	Mean Diastolic BP: 73.56 mmHg
Mean Heart Rate: 84.11 bpm	Mean Heart Rate: 82.77 bpm
Mean Body Temperature: 98.11°F	Mean Body Temperature: 98.23°F
Mean Weight: 159.55 lbs	Mean Weight: 156.56 lbs

Discussion

The purpose of this research was to determine if there was significant difference in heart rate, blood pressure, body temperature, and body weight in women taking combination birth control pills compared to a control group. Upon completion of this research project, no statistically significant differences were found across any of the possible parameters. However, it is still important to highlight that overall means were higher in the birth control group for four out of the five effects. This research showed women taking combination birth control have higher overall means for blood pressure, heart rate, and body weight (Table 1).

Completing human undergraduate research proved to be challenging in terms of research participant compliance, honesty, and personal endurance as long hours in a research laboratory were necessary to perform all of the vital sign checks. As previously stated, limited research studies currently exist examining other effects women encounter on birth control pills other than blood pressure and body weight. Therefore, this research project allowed for innovative thoughts and potential new information regarding side effects of the most popular form of female birth control.

In conclusion, while no significant differences were found across all of the possible effects by birth control and control group, key information and insightful undergraduate research was conducted. In the future, obtaining a higher sample size and conducting the research project over a longer period of time may prove to be more successful. Additionally, monitoring menstrual cycles within research participants may prove to be beneficial in terms of the effects of body temperature.

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Notes and References

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